TRADE MARK

Patents Act

65730/80

APPLICATION ACCEPTED AND AMENDMENTS ALLOWED 18-6-84

STANDARD/~~PETTY~~ PATENT

STATEMENT OF INTENTION TO PROCEED WITH NATIONAL PHASE

538559

I/We STEINHAUS GmbH

of Platanenallee 46, 4330 Mülheim,
Federal Republic of Germany

hereby confirm the intention that the International Application identified below proceed as an application under the Act for the grant of a Standard/~~Petty~~ Patent for an invention entitled
"SELF CLEANING, PERFORATED PLATE FOR OSCILLATING SIEVE"

The International Application is Australian No. :
International No.: PCT/EP80/00141
WIPO No. :

(Note: The following applies only to a Convention application or where there is an earlier Australian provisional specification)

The International Application claims priority from:

Application No.	Country	Filing Date
P 30 06 364.0	Federal Republic of Germany	20th February, 1980

(Note: The following applies only to a divisional application made by virtue of Section 51)

Number of original Application	Applicant

Address for Service: C/- Spruson & Ferguson, Patent Attorneys,
CBA Centre, 60 Margaret Street,
Sydney, New South Wales, Australia

LODGED AT SUB-OFFICE
18 NOV 1981
Sydney

Dated this SEVENTEENTH day of NOVEMBER 1981
STEINHAUS GmbH

FEE STAMPS TO VALUE OF $61 CANCELLED

FEE STAMPS AFFIXED
LODGMENT FEE $61.00

BY:

COMMONWEALTH OF AUSTRALIA

THE PATENTS ACT 1952

AUSTRALIA CONVENTION STANDARD & PETTY PATENT DECLARATION

DECLARATION IN SUPPORT OF A CONVENTION APPLICATION FOR A PATENT

In support of the Convention Application made for a patent for an invention entitled:

"SELF-CLEANING, PERFORATED PLATE FOR OSCILLATING SIEVE"

We, Gerhard Ehlers and Kurt Wolff, both Care of

~~I/We~~ STEINHAUS GmbH

of Platanenallee 46, 4330 Mülheim /Ruhr Germany,

do solemnly and sincerely declare as follows:-

1. ~~I am/We are the applicant(s) for the patent~~

(or, in the case of an application by a body corporate)

1. I am/~~We are~~ authorised by STEINHAUS GmbH

the applicant(s) for the patent to make this declaration on its/~~their~~ behalf.

2. The basic application(s) as defined by Section 141 of the Act was/were made

in Federal Republic of Germany

on 20th February, 1980

by STEINHAUS GmbH

2. ~~I am/We are the actual inventor(s) of the invention referred to in the basic application(s)~~

(or where a person other than the inventor is the applicant)

3. KURT WOLFF

of Flurstr. 42, 4220 Dinslaken, Federal Republic of Germany

(respectively)

is/~~are~~ the actual inventor(s) of the invention and the facts upon which the applicant(s) is/~~are~~ entitled to make the application are as follows:

The said applicant is the assignee of the actual inventor.

4. The basic application(s) referred to in paragraph 2 of this Declaration was/~~were~~ the first application(s) made in a Convention country in respect of the invention(s) the subject of the application.

Declared at Mülheim /R. this 28th day of January, 19

(12) AUSTRALIAN PATENT ABRIDGMENT
(19) AU (11) AU-B-65730/80

(54) SELF-CLEANING PERFORATED PLATE FOR OSCILLATING SIEVE

(71) STEINHAUS GMBH
(87) WO 81/02398 (21) 65730/80 538559
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(31) 3006364 (32) 20.2.80 (33) DE
(43) 1.10.81 (44) 16.8.84
(51)3 B07B 1/46

(72) KURT WOLFF
(74) SF

(56) US 4120785

(57) Claim

1. A perforated bottom plate for oscillating sieves, comprising at least one cast, injection moulded or vulcanised perforated plate of elastic material, having a plurality of screen openings and ribs surrounding and defining the openings, said ribs being joined together to form a single piece and forming the perforated plate, characterised in that at least two of the ribs defining the individual screen openings are of different flexural strength as a result of different cross sections and/or reinforcements, and further characterised in that rib lugs extending into the screen openings are moulded to the ribs of different flexural strength.

AU-A1 65730/80

PCT

WELTORGANISATION FÜR GEISTIGES EIGENTUM
Internationales Büro

INTERNATIONALE ANMELDUNG VERÖFFENTLICHT NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT)

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(33) Prioritätsland: DE

(81) Bestimmungsstaaten: AU, BR, GB (europäisches Patent), JP, NL (europäisches Patent), US.

Veröffentlicht
Mit dem internationalen Recherchenbericht
Mit den geänderten Ansprüchen

(71) Anmelder *(für alle Bestimmungsstaaten ausser US)*: STEINHAUS GMBH [DE/DE]; Platanenallee 46, D-4330 Mülheim (DE).

(72) Erfinder; und
(75) Erfinder/Anmelder *(nur für US)*: WOLFF, Kurt [DE/DE]; Flurstr. 42, D-4220 Dinslaken (DE).

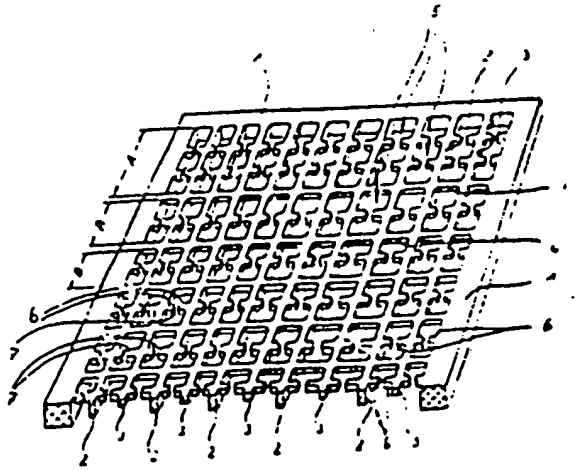
(74) Anwälte: ELBERTZHAGEN, Otto et al; Elsa-Braendstroem-Str. 1, D-4800 Bielefeld 1 (DE).

(54) Title: SELF CLEANING, PERFORATED PLATE FOR OSCILLATING SIEVE

(54) Bezeichnung: LOCHPLATTEN-SIEBBODEN MIT SELBSTREINIGUNGSWIRKUNG

(57) Abstract

The bottom of the oscillating sieve can be composed of at least a cast, injection molded or vulcanised perforated plate, made of an elastic material, such as plastic or rubber. The bottom has a plurality of openings (5) and ribs (2, 3, 4) surrounding them, linked together in a single piece thus forming the perforated plate. Such a plate allows the self cleaning effect to be obtained, in an area of each opening (5), through a relative movement of the opening edges, so as to spread the self cleaning effect over the largest possible area of each opening (5). To this purpose, at least two ribs (2, 3, 4) surrounding the openings (5), have different flexion strenghes obtained through differenciated sections and/or through bracings (8).



(57) Zusammenfassung

Ein Siebboden für Schwingsiebmaschinen kann aus zumindest einer gegossenen, spritzgegossenen oder vulkanisierten Lochplatte aus gummielastischem Material, wie Kunststoff oder Gummi, bestehen. Er besitzt dann eine Vielzahl von Sieböffnungen (5) und diese umschließende Stege (2, 3, 4), die untereinander einstückig verbunden sind und die Lochplatte bilden. Bei einer solchen Lochplatte soll die Selbstreinigungswirkung im Bereich jeder einzelnen Sieböffnung (5) durch eine Relativbewegung der Sieböffnungsränder erzielt werden, um damit den Selbstreinigungseffekt auf einen möglichst großen Bereich jeder einzelnen Sieböffnung (5) auszudehnen. Dazu haben zumindest zwei der die einzelnen Sieböffnungen (5) umschließenden Stege (2 - 4) unterschiedliche Biegesteifigkeit durch unterschiedliche Querschnitte und/oder Bewehrungen (8).

533559 PCT/EP80/00141

Perforated plate with self cleaning effect

TECHNICAL FIELD

This invention relates to a perforated bottom plate or screen for oscillating sieves.

The bottom of a sieve of this type is composed of at least one cast, injection moulded or vulcanised perforated plate of elastic material, such as plastic or rubber, with a plurality of screen openings, and ribs enclosing and defining the openings, said ribs being joined together to form a single piece and forming the perforated plate.

Such sieve plates are mainly employed for the grading bulk materials. To prevent the sieve openings from becoming clogged or choked by near-mesh sized grain, it is known in the art to take measures for the self cleaning of sieve plates of this kind. Usually the sieve openings are designed so as to expand conically in the direction in which the material is passed through the sieve, so that any near-mesh sized grain is carried along in the direction of passage by the material to be screened. However, there are some bulk materials which cause choking of the sieve openings of the perforated plate, the individual particles collecting in the sieve openings being very much smaller than the corresponding near-mesh size grain and the conicity of the sieve openings therefore remaining ineffective against such choking.

STATE OF THE ART

A known screen plate of the above type is described in German specification 27 01 307 which is open to public inspection. Here, the self cleaning effect has been improved by providing elastic tongues with their own oscillating

capacity on the individual screen openings. In this screen plate, each pair of screen openings is connected by a slot, and the strip, or tongue formed in this way and attached to the ribs at one end only, possesses greater elasticity than the edges of the screen openings and performs relative movements to said edges. However, the self cleaning effect resulting from this elasticity is mainly limited to the area of the freely oscillating tongue ends, since movement of the tongues relative to the edges of the screen openings is gradually reduced as the point of attachment of the tongues to the screen opening edges is approached.

Another known screen plate is described in DE-PS 965 456. Here, the screen plate is formed by elastic strip-like elements equipped with striplike tongues, transversely attached to the sides of the strips and extending, according to the purpose of the design, up to the neighbouring striplike element and enclosing the screen openings. These tongues are not connected to the respective neighbouring strips and can therefore perform a natural oscillation and hence, at least in the region of their free ends a relative movement to the continuous ribs, producing a self cleaning effect, which, here again, is limited essentially to the end region of the tongues. The movements of the oscillating strips relative to the ribs, to which they are attached, produce specific problems relating, on the one hand, to the durability and, on the other hand, to the accurate dimensions of the screen openings. Therefore, the tongues, which are capable of additional oscillation, are at least partly reinforced and designed to project downwards beyond the overall profile level, in order to achieve mesh or perforation dimensions of

sufficient accuracy in the movement which is greater than that of the more rigid ribs.

Wire screens, in which the individual screen openings are surrounded by steel screen wires, have been known for a considerable period. A variation in the configuration or the thickness of the neighbouring screen wires produces relative movements of the individual screen wires resulting in a cleaning effect. The individual screen wires of varying flexural strength must be attached to a common supporting frame in a co-ordinated manner. Although wire screens of this type have been used for more than twenty years, they have been unable to provide any stimulation for improving the self-cleaning effect in screen plates with perforated plates of elastic material as described above. (Refer Obering. Kurt Wolff: "Siebböden und ihre Verwendung" in "Aufbereitungstechnik", volumes 1 (1960), No. 11, pages 457 - 473 and No. 12, pages 501 - 508).

THE INVENTION

Proceeding from a screen plate of the type described above, it is the task of the invention to attain the self-cleaning action in the area of each individual screen opening by a relative movement of the edges of the screen opening, thereby extending the self-cleaning effect over the maximum area of each individual screen opening.

In a screen plate of the generic type this task is solved in that at least two of the ribs enclosing the individual screen openings are of different flexural strength because of different cross sections, and/or are provided with reinforcements.

It is a particular advantage of the screen plate of

the invention that the continuous ribs of the perforated plate are deformed relative to one another in the course of operation, permitting the individual screen apertures to become distorted within a definable range. The distortion extends over the total area of each screen opening, especially if the ribs of different flexural strength are arranged on opposite sides of the screen openings. The advantages of relative mobility of ribs of different flexural strength can be made available not only for slotlike screen openings, but also for rectangular, square or round screen openings, provided the screen openings are defined by attachments moulded to the ribs, said attachments participating in the relative mobility of the ribs to which they are joined. These attachments can also perform a natural oscillation in addition to that performed by their ribs, and so support the cleaning effect.

The variation in flexural strength of the two ribs associated with each screen opening can be due to a different cross-sectional shape or size, insofar as the difference of the cross-sections is concerned. The difference of flexural strength of each of the two ribs can also be influenced by a reinforcement. However, in principle it is possible to manage without different cross-sectional forms and dimensions, if the ribs are provided with reinforcements. In ribs of different flexural strength the reinforcement can be varied, however, in a preferred embodiment a rib with reinforcement and a rib without reinforcement are alternated.

Appropriately, ribs of different flexural strength are arranged parallel to one another. This facilitates the formation of regularly arranged screen openings of equal size,

especially of screen slots. Because of the parallel arrangement of these ribs, the opposing edges of individual screen openings differ in their oscillation behaviour. This is quite independent from the shape or formation of the screen openings, and is of particular advantage, if, as has been mentioned above, the screen openings are also defined by attachments located transversely to the ribs. Furthermore, the screen openings are also defined by edge ribs, or by ribs crossing the ribs of different flexural strength, said transverse ribs forming the mesh system of the screen plate. Because of the cast, injection moulded or vulcanised construction of the perforated plate, all ribs are joined together to form an integral whole.

In an all round supported perforated plate the oscillation amplitude near the centre of the plate is greater than along the supported edge, because of the diaphragm effect. In order to achieve a satisfactory level of self cleaning near the edges under these conditions, it is of advantage to reduce the rigidity of the mesh system of the parallel and transverse ribs by increasing the spacing between either both the parallel and the transverse ribs, or only the parallel or transverse ribs, near the edges of the plate. This also produces a larger oscillation amplitude near the edge of the screen plate.

The oscillation and/or the wear of ribs of different flexural rigidity can also be influenced by varying the amount by which the ribs project beyond the top of the perforated plate. The ribs of greater elasticity can project beyond the top of the plate, causing the material to be screened to bounce against the projecting ribs thereby increasing their

oscillation and hence the self cleaning effect. Alternatively, the ribs of greater rigidity can be designed to project beyond the top of the perforated screen. The alternative measure is used when it is desired for the projecting ribs of greater rigidity to support the larger particles of the material to be screened, and thereby relieve the areas of greater elasticity and protect them against wear.

In addition to the self cleaning effect attained by varying the flexural rigidity of the ribs, a screen plate according to the invention can also be equipped with screen openings expanding conically in the direction of passage to provide for the release of near-mesh size grain.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is now described in greater detail with reference to the illustrated embodiments, wherein:

Fig. 1 is a perspective cross-sectional plan view of a perforated plate for a sieve bottom according to a preferred embodiment of the invention,

Fig. 2 is a cross-section through a different embodiment of a perforated plate for sieve bottom according to the invention and,

Fig. 3 is a partial cross section through a further embodiment of a perforated plate for a sieve bottom according to the invention,

Fig. 4 is an enlarged partial cross-section of a fourth embodiment of a perforated plate for a sieve bottom according to the invention.

BEST METHOD OF CONSTRUCTING THE INVENTION

Fig. 1 illustrates the basic construction of a perforated plate for a sieve bottom designed for use in

oscillating sieves for grading bulk materials. The perforated plate is constructed from an elastic material such as plastic or rubber, and is cast, injection moulded or vulcanised in one piece from this material.

Along its edge the perforated plate is equipped with edge ribs 1, longitudinally extending ribs 2 and 3, and transversely arranged ribs 4 being located between said edge ribs. In the following these ribs will be referred to as longitudinal and transverse ribs, although, in principle, they may also extend obliquely relative to one another or to the edge ribs 1. It is also possible to interchange the construction and function of the longitudinal and transverse ribs, and this interchange can be applied to the perforated plate as a whole or to parts thereof.

Edge ribs 1, which act as supports or clamps for the perforated plate, possess a larger cross-section than longitudinal ribs 2 and 3 and transverse ribs 4. Longitudinal ribs 2 and longitudinal ribs 3 also differ in their cross-sectional dimensions. Although the shape of the cross-sections is the same, since longitudinal ribs 2 and longitudinal ribs 3 have square or rectangular cross sections, the cross-sectional dimensions of ribs 2 and 3 are different. Longitudinal ribs 2 possess a larger cross section than longitudinal ribs 3, and, although they are constructed from the same material they have greater flexural strength than longitudinal ribs 3 of smaller cross-section, because of their larger cross-section.

Therefore, their oscillation differs from that of the more elastic longitudinal ribs 3, causing longitudinal ribs 2 to perform a relative movement to longitudinal ribs 3

in operation.

The basic shape of sieve openings 5 is deformed in operation because of the relative movement of ribs 2 and 3, and because longitudinal ribs 2 and 3 enclose between them a row of successive sieve openings 5, i.e., limit sieve openings 5 on opposite sides. The sieve openings 5 can be constructed as continuous elongate slots between transverse ribs 4, or, alternatively, transverse ribs 4 can be completely elminated, so that the slotlike sieve openings 5 are then located merely between edge ribs 1 at opposite ends of the perforated plate. Naturally, the number of transverse ribs 4 supporting the mesh system of the perforated plate depends also on the size of the perforated plate. It is, however, largely independent from the length of sieve openings 5, since the sieve openings can also be limited by lugs 6 on longitudinal ribs 2 and 3. In the illustrated embodiment two such rib lugs 6 are moulded to different ribs 2, 3 and are located opposite one another, but alternatively, it is also possible to stagger the arrangement of lugs 6 on ribs 2, 3. A gap 7 is left between the two opposing ends of rib lugs 6, to enable rib lugs 6 attached to ribs of different oscillation behaviour to move freely relative to one another. Gap 7 at the front end of respective rib lug 6 must be provided even though rib lug 6 extends up to the respective longitudinal rib located opposite. Rib Lugs 6 enable each opening between ribs 2, 3 of different flexural strength to be subdivided in such a manner that it is possible to form sieve openings 5 of any desired configuration.

It will also be noted from Fig. 1 that length "A" between edge rib 1 and neighbouring transverse rib 4 is longer

than length "B" separating the various transverse ribs from one another. This longer length of support "A" provides for greater elasticity of the mesh system of ribs 2, 3 and 4 in the area of the particular edge rib 1 to which ribs 2 and 3 of different flexural strength are joined. As the whole perforated plate oscillates like a diaphragm during operation, and since longitudinal ribs 2 and 3 of different flexural strength in the centre region therefore have the greatest oscillating amplitude, the area of smaller oscillation amplitude near edge rib 1 is comparatively disadvantaged but this can be balanced by greater elasticity in this edge region. In order to achieve the same effect in the edge zone near those edge ribs 1, arranged parallel to longitudinal ribs 2 and 3, the distances between these longitudinal ribs 2 and 3 and the respective edge ribs 1 can also be increased.

Quite independently from this, however, it is preferable ~~essential~~ that ribs 2 of greater flexural strength are always alternated with ribs 3 of lesser flexural strength, so that, when observed in the direction of transverse ribs 4, a longitudinal rib 2 of greater rigidity is always followed by a longitudinal rib 3 of greater elasticity, and this, in turn, is again followed by a longitudinal rib 2 of greater rigidity.

Fib. 2 illustrates an embodiment of a perforated plate in which the different flexural strength of longitudinal ribs 2 and 3 is not the result of varying cross-sectional shapes or sizes, but of a reinforcement 8. Here, longitudinal ribs 2 and 3 possess identical cross sections, and, when observed in transverse direction, reinforcement 8 is embedded merely in every second longitudinal rib 2, while alternate

longitudinal ribs 3 have no reinforcement.

Fig. 3 illustrates an embodiment of a perforated plate with longitudinal ribs 2 of greater rigidity moulded to a greater level of height to form projections 9 rising above the upper screen surface 10 and designed to protect the ribs of greater elasticity, namely longitudinal ribs 3 and transverse ribs 4 against extreme wear. Projections 9 can also be used to influence the oscillation behaviour, however, for this purpose it is preferable to provide projections 9 on longitudinal ribs 3 of greater elasticity.

Fig. 4 illustrates the possibilities of equipping longitudinal ribs 2 of greater flexural strength with a stronger reinforcement 8, and also of providing longitudinal rib 3 of greater elasticity with a reinforcement 8 that is more flexible than that of the longitudinal ribs 2 of greater rigidity. Thus, the different flexural strength of this embodiment is the result of both the cross-sectional measurements of longitudinal ribs 2 and 3, and of the different flexural rigidity. Appropriately, reinforcement 8 is arranged in the lower third of the cross-sections of longitudinal ribs 2 and 3.

Fig. 4 also illustrates particularly clearly the wedgelike construction of longitudinal ribs 2 and 3, which is also employed in the transverse ribs 4, and results in a widening of sieve openings 5 in the direction of passage. This is achieved in longitudinal ribs 2 of greater rigidity and also in the more elastic longitudinal ribs 3 and transverse ribs 4 - although not clearly visible in Fig. 4 - by a converging in the direction of passage of lateral surface 11 and 12 of ribs 2 - 4.

In addition, Fig. 4 illustrates yet another characteristic of attachments 6 on longitudinal ribs 2 and 3, insofar as attachments 6 on either side of a given rib have end surfaces 13 which diverge in the direction of passage, causing, in turn, gap 7 between said end surfaces to expand in the direction in which the material to be screened is passed through the perforated plate. Provision should also be made for a corresponding inclination of end surfaces 13 of rib attachments 6, if rib attachments 6 of a given rib 2 or 3 enter into contact with a neighbouring rib 3 or 2, in which case the conicity of gap 7 is produced by sloping end surface 13 of the particular rib attachment 6 and the sloping lateral surface 11, 12 of the particular rib 2 or 3.

As further illustrated in Fig. 4, rib attachments 6 can taper towards their free ends, i.e., the end surface 13. This is preferably brought about by lower surface 14 of rib attachments 6 sloping towards the upper surface 10. Alternatively, lower surfaces 14 of rib attachments 6 can also be arched, and end surfaces 13 of rib attachments can gradually merge with lower surfaces 14 of these rib attachments 6.

The claims defining the invention are as follows:

1. A perforated bottom plate for oscillating sieves, comprising at least one cast, injection moulded or vulcanised perforated plate of elastic material, having a plurality of screen openings and ribs surrounding and defining the openings, said ribs being joined together to form a single piece and forming the perforated plate, characterised in that at least two of the ribs defining the individual screen openings are of different flexural strength as a result of different cross sections and/or reinforcements, and further characterised in that rib lugs extending into the screen openings are moulded to the ribs of different flexural strength.

2. A perforated plate according to claim 1, characterised in that one of said at least two ribs of different flexural strength is fitted with a reinforcement, while the other is not reinforced.

3. A perforated plate according to claim 1 or 2, characterised in that the ribs of different flexural strength are alternated and arranged in parallel relationship.

4. A perforated plate according to claim 3, characterised in that the parallel ribs are connected by transverse ribs possessing different flexural strengths.

5. A perforated plate according to claim 4, characterised in that the spacing between the parallel ribs and/or the transverse ribs is greater in edge zones of the perforated plate than near the centre of the said plate.

6. A perforated plate according to any one of claims 1 to 5, characterised in that on the upper surface of the

screen plate the ribs of one flexural strength project beyond the ribs of the other flexural strength.

7. A perforated plate according to any one of claims 3 to 6, characterised in that the rib lugs on the parallel ribs are either positioned in a staggered arrangement or opposite one another, and further characterised in that a gap is formed between the end face of a rib lug and the respective opposite rib or rib lug.

8. A perforated plate according to claim 7, characterised in that the gap between two rib lugs expands in the direction of passage.

9. A perforated plate according to claims 7 or 8, characterised in that the rib lugs taper towards their free ends.

10. A perforated plate as claimed in any preceding claim wherein said elastic material comprises plastic or rubber.

11. A perforated bottom plate substantially as described herein with reference to any one of the accompanying drawings.

DATED this THIRTY-FIRST day of MAY 1984

STEINHAUS GmbH

Patent Attorneys for the Applicant
SPRUSON & FERGUSON

65730/80

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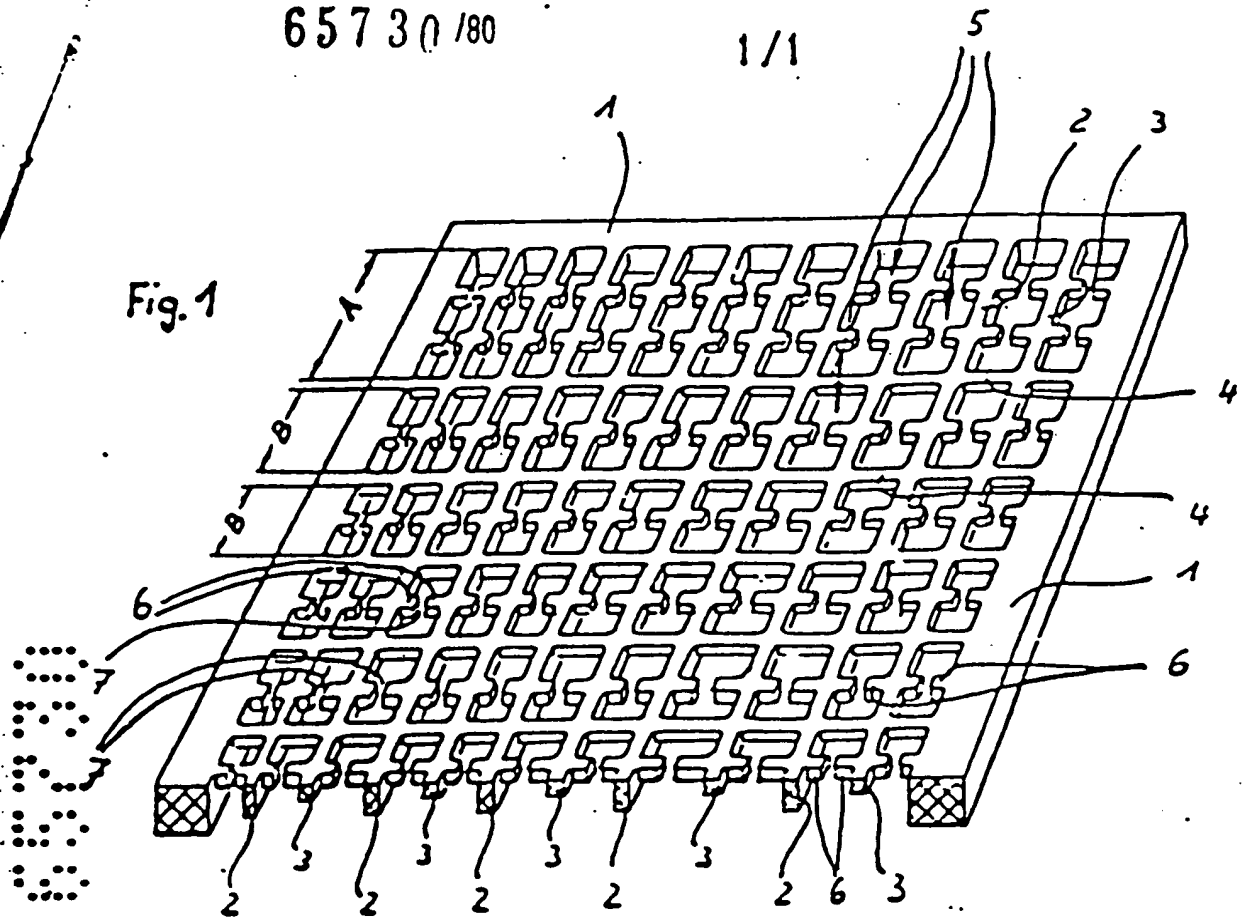

Fig. 1

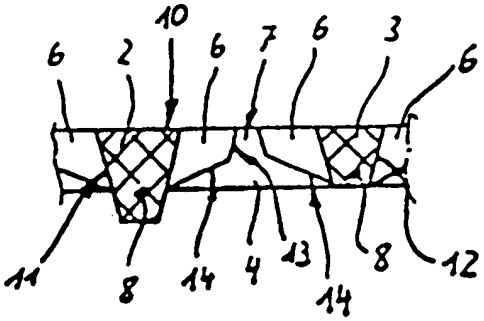

Fig. 4

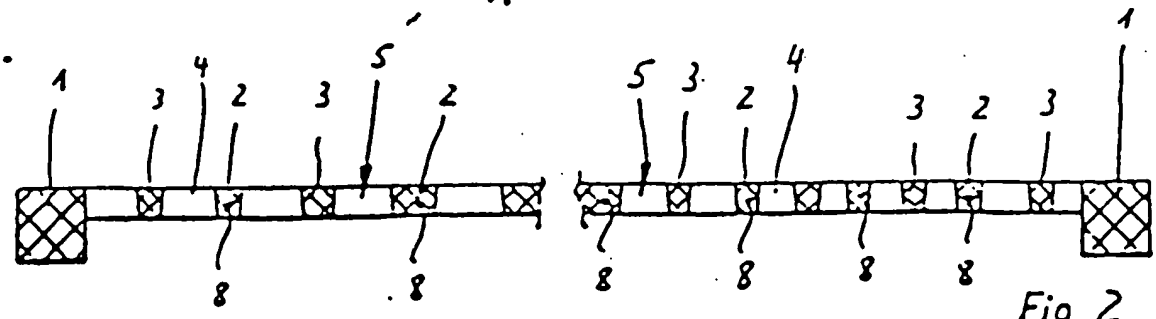

Fig. 2

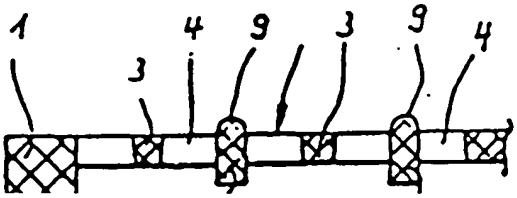

Fig. 3

INTERNATIONAL SEARCH REPORT

International Application No PCT/EP 80/00141

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ¹

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl.³ : B 07 B 1/46

II. FIELDS SEARCHED

Minimum Documentation Searched ⁴

Classification System	Classification Symbols
Int.Cl.³	B 07 B

Documentation Searched other than Minimum Documentation to the Extent that such Documents are included in the Fields Searched ⁵

III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴

Category ¹⁵	Citation of Document, ¹⁶ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸
	GB, A, 883176, published on 22 November 1961, see page 1, lines 55–page 2 line 29, page 2, lines 59–86, figures 1,2, Gerhard Hopper corresponding to DE, A, 1036782	1,3,4
	GB, A, 1024290, published on 30 March 1966, see page 2, lines 49–60, figure 5, Ruhrkunststoff	1,3
	US, A, 4120785, published on 17 October 1978, see column 4, line 30- column 7, line 3, figures 8–13, Kanamori	1
	Patent Abstracts of Japan, Band 2, Nr. 69, 25 May 1978, page 1399M78, JP, A 5332467, 27 March 1978, Bridgestone Tire K.K.	1,6
A	DE, A, 2102617, published on 29 July 1971, BBA Group Ltd.	1
A	DE, C, 975500, published on 14 December 1961, Brückenbau Flender	1,5
	DE, B, 2701307, published on 3 May 1978, Carl Schenck cited in the application	
	DE, C 965546, published on 13 June 1957, Brückenbau Flender cited in the application	

¹⁵ Special categories of cited documents: ¹⁸

"A" document defining the general state of the art

"E" earlier document but published on or after the international filing date

"L" document cited for special reason other than those referred to in the other categories

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but on or after the priority date claimed

"T" later document published on or after the international filing date or priority date and not in conflict with the application, but cited to understand the principle or theory underlying the invention

"X" document of particular relevance

IV. CERTIFICATION

Date of the Actual Completion of the International Search ¹	Date of Mailing of this International Search Report ²
23 February 1981 (23.02.81)	4 March 1981 (04.03.81)

International Searching Authority ¹	Signature of Authorized Officer ²⁰
European Patent Office	